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A new species of *Metatanais* Shiino, 1952 (Crustacea, Tanaidacea, Paratanaoidea) from Australian coral reefs, with a redefinition of the genus

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Abstract

This paper presents a description of the new species *Metatanais bipunctatus* **sp. n.** found on coral reefs at two sites in Australia: Lizard Island (Queensland) and Ningaloo Reef (north-western Australia). The new species is the second member of the genus and it is morphologically almost identical to type species *M. cylindricus* Shiino, 1952, recorded from algae on the surface of ascidians or sponges in shallow waters off Seto (north-western coast of Japan). The new species was compared with the holotype of *M. cylindricus* and it can be distinguished from it by relatively short first article in antennule, compact propodus of pereopod 6 (about three times as long as wide) and robust ventral spiniform seta on propodus of last three pairs of pereopods. The definition of the genus has been amended and appendages (where possible) of *M. cylindricus* has been figured.

Keywords

Metatanais, Tanaidacea, coral rubble, CReefs, Australia

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Introduction

The genus *Metatanais* was erected by Shiino (1952) to accommodate *M. cylindricus* Shiino, 1952 which was collected together with two new apseudomorph species, *Parapseudes latifrons* (Shiino, 1952) and *Gollumudes littoralis* (Shiino, 1952), in the vicinity of Seto (Honshu, Japan). *M. cylindricus* and *P. latifrons* inhabited algae and the surface of sponges at shallow depths (*P. latifrons*), while *G. littoralis* lived among barnacles growing on littoral rocks. No further material of *Metatanais* has been recorded since Shiino's original description.

The genus *Metatanis* is a valid taxon and is clearly distinct from other tanaidomorph genera. The original definition by Shiino (1952) is imprecise and did not address the key diagnostic characters of the genus sufficiently. The discovery of a new species of *Metatanais* at two sites in Australia, Lizard Island (Queensland) and Ningaloo Reef (Western Australia), during the CReefs Program (Census of Coral Reefs; http://www.aims.gov.au/creefs/field-program.html) has offered the opportunity to interpret the morphology of this taxon more comprehensively and to redefine the genus.

Material and methods

The material was collected during two CReefs (Australia) fieldtrips organized by AIMS (Australian Institute of Marine Science) to Lizard Island (Great Barrier Reef) and Ningaloo Reef (mid-Western Australia).

Pieces of coral rubble were collected by hand using SCUBA and, at the laboratory, were placed into buckets (20L) with a few drops of formaldehyde for a while to agitate animals causing them to leave their microhabitats (tubes and crevices). The samples with animals still alive were then washed through a fine mesh (0.3 mm), the residue sorted under a microscope and tanaidacean specimens collected were preserved in 80% ethanol. The type material is deposited at the Museum of Tropical Queensland (Great Barrier Reef specimens) and at the Western Australian Museum, Perth (Ningaloo specimens). Terminology follows Larsen (2003).

Systematics

Order Tanaidacea Dana, 1849
Suborder Tanaidomorpha Sieg, 1980
Superfamily Paratanaoidea Lang, 1949
Family Nototanaidae *sensu lato* Sieg, 1976

Genus *Metatanais* Shiino, 1952

Metatanais Shiino, 1952: 23.

Diagnosis: Body rigid, well calcified, cuticle surface smooth and glossy; eyes present, pigmented; all pereonites wider than long; pleon half as long as pereon. Antennule robust, 3- articled with article 1 large, embracing base of article 2; articles 2 and 3 as long as wide. Antenna robust, 6-articled; article 4 only little longer than article 2. Labrum hood-shaped, setose. Mandibles robust, *lacinia mobilis* of moderate size; molar with 5–6 tubercles. Maxillule with eight terminal spines and distally setose outer margin; palp with two distal setae. Maxilliped endites oval, plate-like, longer and wider than basis, with a few short setae terminally. Epignath with cluster of short setae distally. Cheliped compact, attached by sidepiece, merus and carpus without setae ventrally; fixed finger with minute seta ventrally and two minute setae on inner margin. Pereopods 1–6 ambulatory; pereopods 1–3 ischium lacking setae; pereopods 1–2 merus lacking setae; pereopods 3–6 merus with spines; pereopods 1–6 carpus with spines. Pleopods absent in females. Uropods uniramous; endopod biarticulated.

Type species: *Metatanais cylindricus* Shiino, 1952; by original designation; gender masculine.

Species included: *M. cylindricus*, *M. bipunctatus* sp. n.

Remarks

Metatanais has a well-calcified, smooth and glossy cuticle. The calcification is much stronger than in most Pseudotanaidae (Sieg 1976) or Nototanaidae (Sieg 1976), in which families the genus have been classified in the past, and can be only compared to some genera of the Agathotanaidae (Lang 1971) and Colletteidae *sensu lato* (Larsen and Wilson 2002) for example *Libanius* Lang, 1971, although their cuticle is rather more matte in appearance.

Metatanais has a three-articulated antennule, with the first article robust and overlapping the small second article, a disc-shaped maxilliped endite, an epignath tipped by bunch of small setae, a lack of regular setae on the merus and carpus of all pereopods, and a uniramous uropod. This unique combination of characters was not used in the definition given by Shiino (1952), while the emphasis in his discussion was on 'degenerated pleopods' and for this reason an affinity of *Metatanais* with *Pseudotanais* Sars, 1882 was suggested.

In the first phylogenetic tree for the Tanaidomorpha (Larsen and Wilson 2002), *Metatanais* was classified with the Nototanaidae *sensu lato*, owing to its three-articled antennule, and lack of plumose seta on pleonites (characteristic for the Paratanaidae Lang, 1949), its short uropod and lack of spines on second and third antenna articles (in contrast to the Leptognathiidae Sieg, 1976) and regularly developed pleonites (in contrast to the Pseudozeuxidae Sieg, 1982). Further attempts to understand the relationships within the Tanaidomorpha have demonstrated that the Nototanaidae is a polyphyletic family (Bird and Larsen in press., Błażewicz-Paszkowycz and Poore 2008) and none of the taxa formerly included show affinities to *Metatanais* (Blazewicz-Paszkowycz and Poore 2008). Alternatively, Bird and Larsen (in press) implied a weak relationship between *Metatanais* and the Paratanaidae. This uncertain position of *Metatanais* compels us to regard it as Nototanaidae *sensu lato* at present, until the whole suprageneric classification within the Paratanaoidea is resolved better.

Metatanais cylindricus Shiino, 1952

Figs 1, 2

Metatanais cylindricus Shiino, 1952: 24–27, figs 6–7; Larsen and Shimomura, 2007: 2.

Material examined: *Lectotype* female (dissected on slides) (NSMT-Cr 14507), among algae and on surface of sponges and compound ascidiae, coll. Sakata and Toshima, Seto, 9–12 May, 1948.

Diagnosis: Body three times as long as wide. Carapace shorter than wide. Antennule article 1 more than twice as long as wide. Pereopod 4–6 propodus slim (about five times as long as wide), with small setae ventrally.

Remarks: *Metatanais cylindricus* was described from 23 specimens found in shallow water off Seto (north-western coast of Japan) among aggregation of sponges and ascidiae, and catalogued as syntypes at the National Museum of Nature and Science in Tokyo. From this collection we have been loaned only one specimen which we have here designated the lectotype. It was partially dissected and drawn.

In the original species description Shiino stated that specimens studied by him were females as "Neither rudimental oostegites nor mare genital papillae …" were discovered. Based on the present knowledge about the tanaid life history we can assume that Shiino has deal with both sexes, where males had the rudimental pleopods (Shiino, 1952: 26, fig 7M), and females lacked them, as loaned lectotype.

M. cylindricus is morphologically almost identical to *M. bipunctatus* sp. n. It can be distinguished from the new species by most compact body, with cephalothorax clearly shorter than its length (Fig 1). The antennule article 1 in *M. cylindricus* is almost three times as long as wide and 'columnar' according to Shiino (1952), while it seems to be more robust and just less than twice as long as wide in the new species (Fig 2A). The species also has much slimmer propodus in pereopod of the last three pairs (over four times as long as wide). The obvious difference between the species is the form of seta

on ventral margin of the propodus in pereopod 4–6 that is small and weak seta in *M. cylindricus* (Fig 2 G–I) and robust in the new species (Fig 5 E–G).

***Metatanais bipunctatus* sp. n.**
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Figs 3–5

Material examined: *Holotype*: Female (1.7 mm) (MTQ W31164), CGLI 31, 14.68039°S, 145.4453°E, Lizard Island, Casuarina Beach, dead coral, depth 1 m, 15

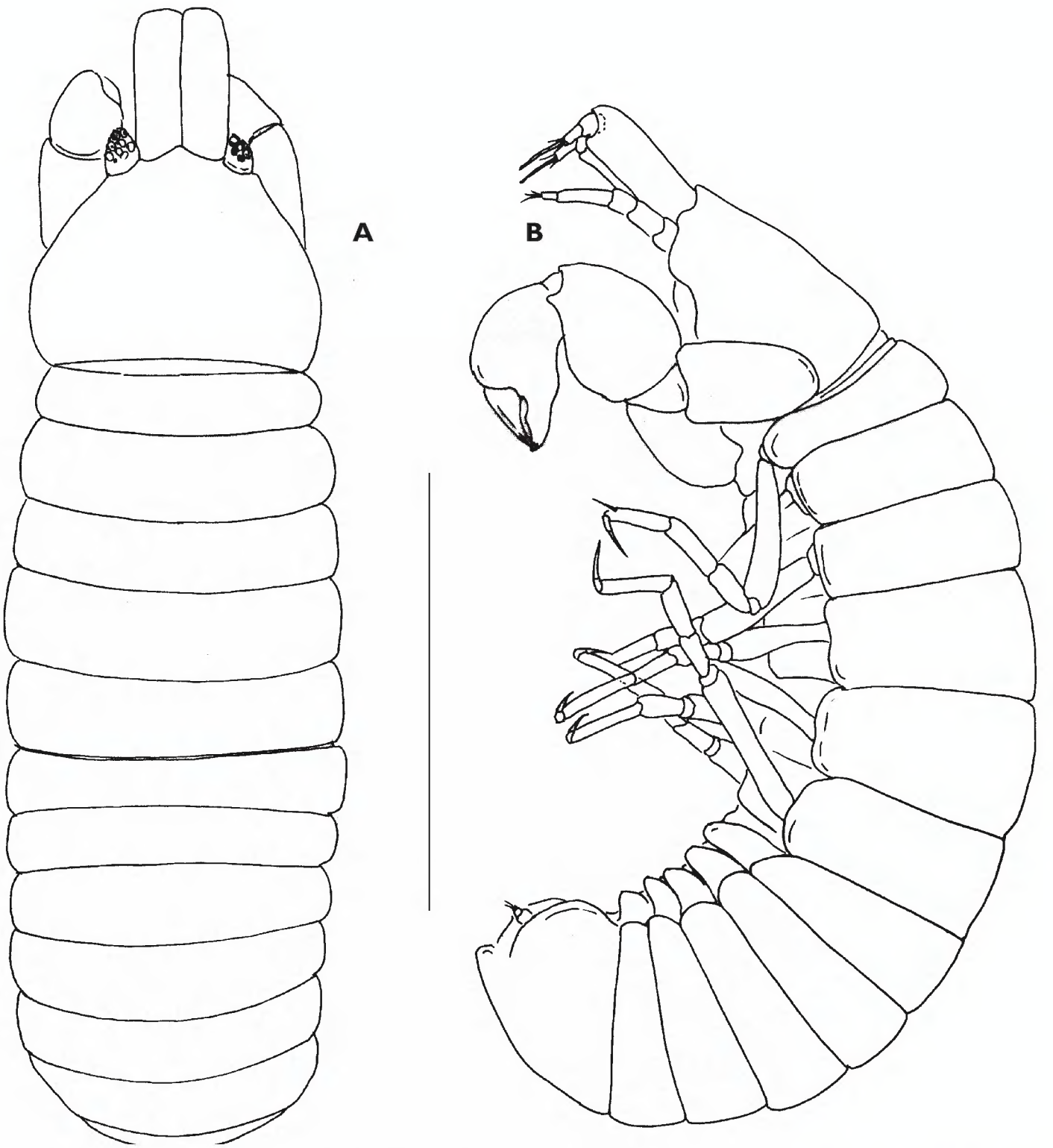

Figure 1. *Metatanais cylindricus* Shiino 1952 female, lectotype **A** body, dorsal **B** body, lateral. Scale bar equals 1 mm.

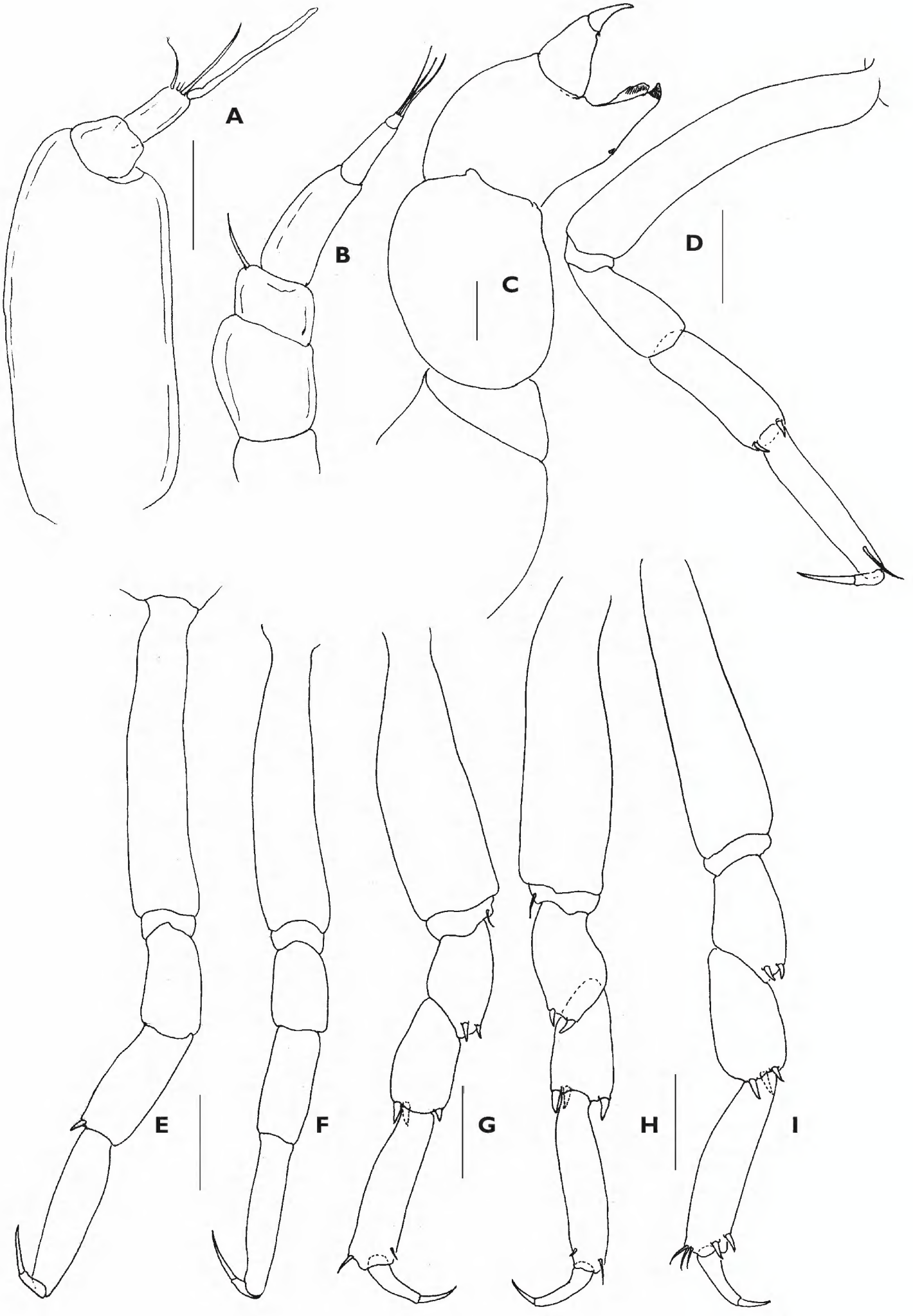

Figure 2. *Metatanais cylindricus* Shiino, 1952, female, lectotype. **A** antennule **B** antenna **C** chela **D** pereopod 1 **E** pereopod 2 **F** pereopod 3 **G** pereopod 4 **H** pereopod 5 **I** pereopod 6. Scale bars equal 0.1mm.

Apr 2008. *Paratypes*: 1 specimen (1.5 mm), (MTQ W31164), CGLI 20, 14°64.553'S, 145°65.335'E, North Point, dead coral rubble, depth 0.5–1.5 m, 12 Apr 2008. 1 specimen, dissected in slides (WAM C42469), NIN 17, Western Australia, Ningaloo

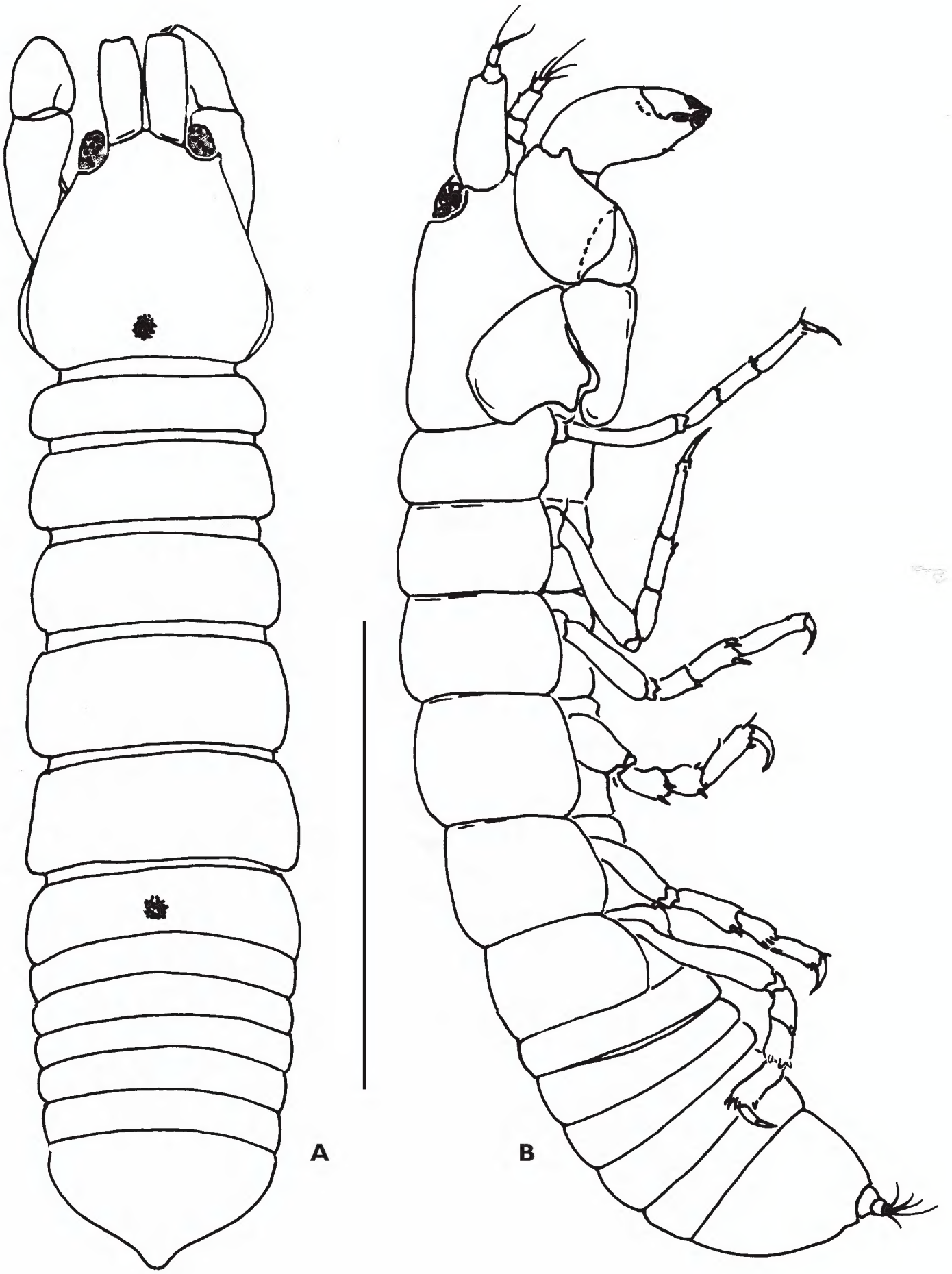

Figure 3. *Metatanais bipunctatus* sp. n. female, **A** body, dorsal **B** body, lateral. Scale bar equals 1 mm.

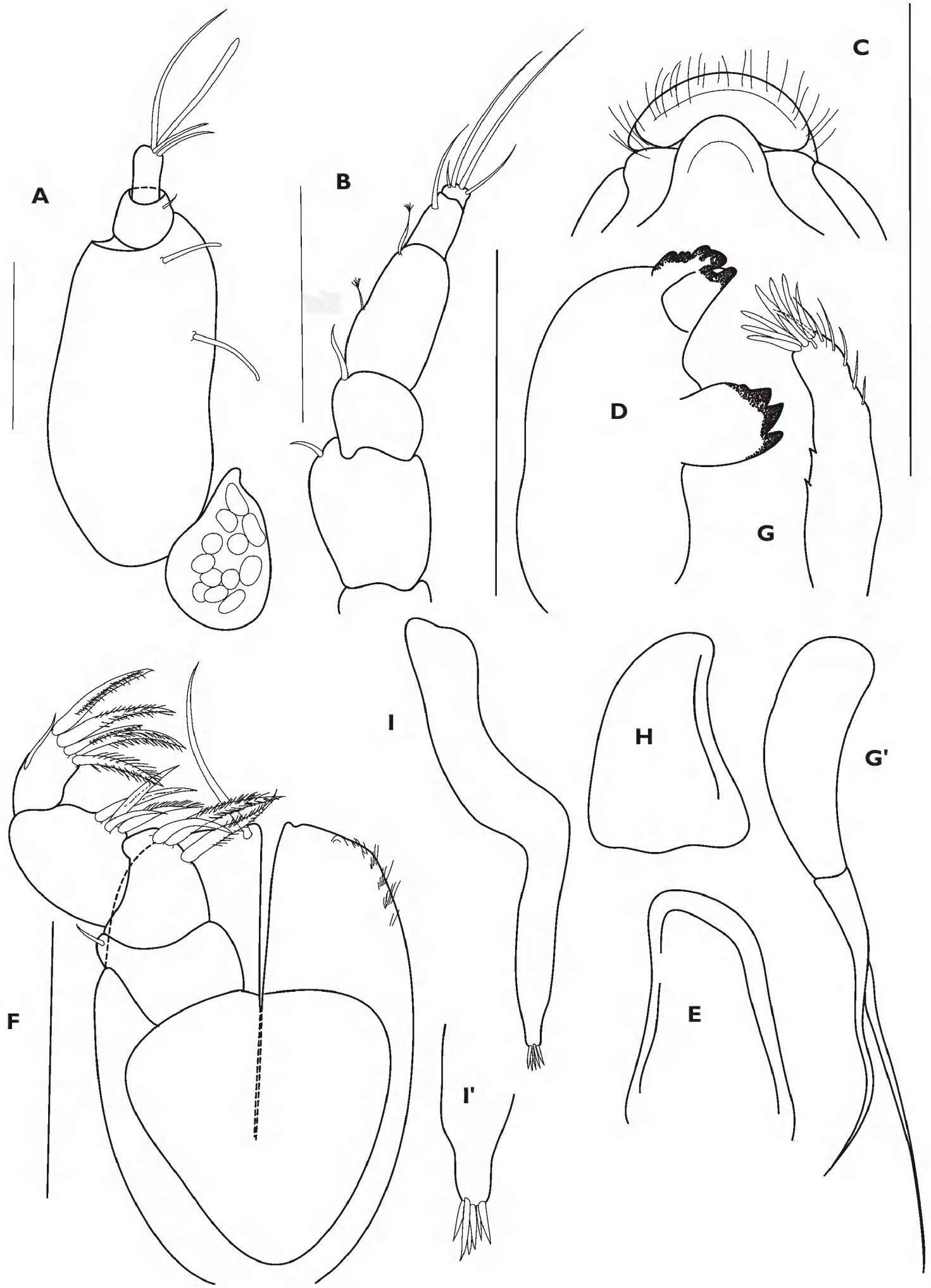

Figure 4. *Metatanais bipunctatus* sp. n. paratype, female. **A** antennule **B** antenna **C** labrum **D** left mandible **E** right mandible **F** maxilliped **G** maxillule **G'** maxillule palp **H** maxilla **I** epignath **I'** detail of epignath. Scale bars equals 0.01mm.

Reef, off Tantabiddy, reef front 21.92833°S, 113.9196°E, dead *Acropora* head, depth 13–15 m, 17 Jun 2008.

Diagnosis: Body over four times as long as wide. Antennule article 1 less than twice as long as wide. Pereopod 4–6 propodus compact (about three times as long as wide), with spiniform setae ventrally.

Etymology: *bipunctatus* [Latin]: with two spots, referring to presence of dorsal orange spots, one on the posterior of the carapace and one on pereonite 6.

Description: Female without oostegites (Fig. 1A, B) 1.5 mm long. Body about 4.5 times as long as wide. Carapace 16% of body length, as long as wide, without rostrum, tapering towards the anterior, with mid-dorsal orange spot near posterior margin. Pereon about half of total body length. All pereonites wider than long, margins rounded in dorsal view. Pereonite 1 0.25 times as long as wide; pereonites 2 and 3 subequal and little longer than pereonite 1. Pereonites 4 and 5 subequal, 0.4 times as long as wide. Pereonite 6 subequal to pereonite 2, with orange spot mid-dorsally. Pleonites subequal in size (0.15 times as long as wide); pleotelson as long as combined length of pleonites 3 to 5, tapering posteriorly, produced medially.

Antennule (Fig. 2A) three-articled; article 1 barrel-shaped, half as long as carapace, less than twice as long as wide, with two simple, blunt setae on distal upper margin, distally overlapping base of article 2. Article 2 as long as wide, about one fifth as long as article 1, with one seta. Article 3 subequal in length to article 2, but slightly narrower, with one long and two short rod setae and one aesthetasc distally.

Antenna (Fig. 2B) six-articled. Article 2 1.1 times as long as wide, with one setae distally. Article 3 little shorter than wide, half as long as article 2, with one simple setae distally. Article 4 compact, about twice as long as wide, and subequal in length to article 2, with two pinnate setae along the dorsal margin. Article 5 1.3 times as long as wide, with one simple seta distally. Article 6 minute, with two long and two short distal setae.

Mouthparts: Labrum (Fig. 2C) hood shaped, with fine setae. Left mandible (Fig. 2D) molar robust, as long as wide, incisor with sharp processes distally; *lacinia mobilis* of moderate size, distal margin crenulated; right mandible (Fig. 2E) incisor process simple, *lacinia mobilis* absent. Maxillule (Fig. 2G) endite with eight spiniform setae distally and setose outer margin. Palp (Fig. 2G') with two articles, distal article tipped by two long simple setae. Maxilla (Fig. 2H) triangular, naked. Maxilliped (Fig. 2F) bases semi-fused; endites plate-like, exceeding bases of maxilliped distally and laterally, with one long simple setae distally and anterolateral rows of fine setae. Maxilliped palp article 1 with simple seta on outer margin; article 2 wedge-shaped with two plumose and one simple seta on the inner margin; article 3 with one plumose seta and three simple setae on the inner margin; article 4 with five plumose setae distally and one simple seta on outer margin.

Epignath (Fig. 2I, I') narrow with six short simple setae on distal margin.

Cheliped (Fig. 3A) basis as long as wide; similar in size to sidepiece. Merus wedge-shape, naked. Carpus 1.3 times as long as wide, with one seta on dorsal margin. Propodus massive about twice as long as wide; palm little longer than dactylus; fixed finger

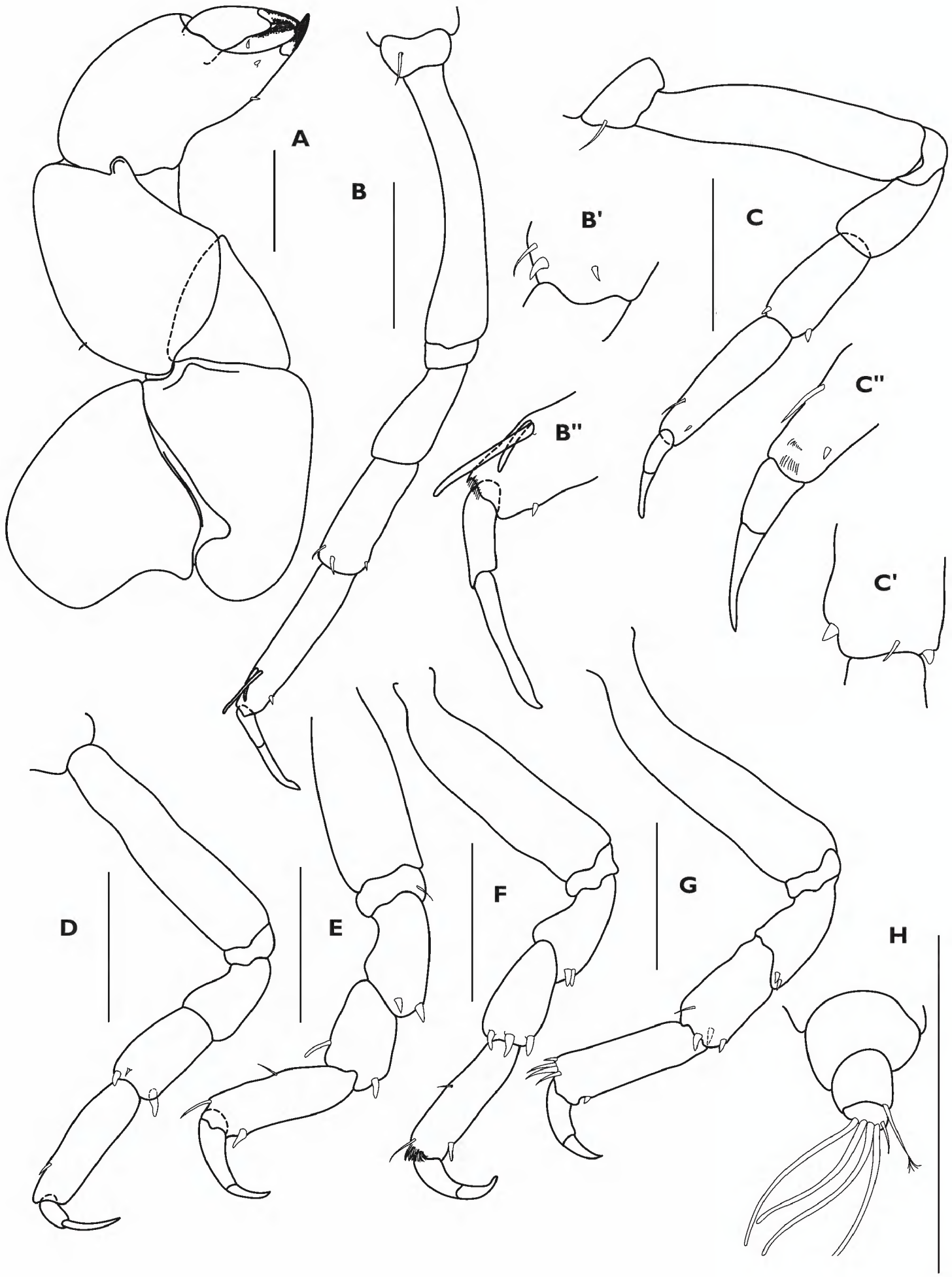

Figure 5. *Metatanais bipunctatus* sp. n. paratype female. **A** cheliped **B** pereopod 1 **B'** pereopod 1 carpus detail **B"**pereopod 1 propodus detail **C** pereopod 2 **C'** pereopod 2 carpus detail **C"**pereopod 2 propodus detail **D** pereopod 3 **E** pereopod 4 **F** pereopod 5 **G** pereopod 6 **H** uropod. Scale bars equal 0.1mm for A–G; 0.01 mm for H.

with strongly calcified inner margin; two small setae on ventral margin. Dactylus little longer than well-calcified unguis.

Pereopod 1 (Fig. 3B) coxa with one simple seta on dorsal margin; basis about as long as combined length of carpus and propodus, 5.3 times as long as wide. Ischium naked. Merus as long as carpus, naked. Carpus with two spines and one seta distally (Fig. 3B'). Propodus (Fig. 3'') 1.4 times as long as carpus, with two dorso-distal rod setae and one minute spine ventrally. Dactylus shorter than unguis.

Pereopod 2 (Fig. 3C–C'') similar to pereopod 1, but propodus (Fig. 3C'') with one rod seta dorso-distally.

Pereopod 3 (Fig. 3D) similar to pereopod 2, but merus with two minute distal spines ventrally, propodus without simple setae on the dorsal margin.

Pereopod 4 (Fig. 3E) basis broken; ischium with one simple seta, merus with two short spines disto-ventrally; carpus with one rod seta and spine distally, propodus with one simple seta distally, one spine ventrally and one fine seta in middle of dorsal margin; dactylus twice as long as unguis, curved.

Pereopod 5 (Fig. 3F) similar to pereopod 4, but ischium naked and carpus with three thick short distal spines.

Pereopod 6 (Fig. 3G) similar to pereopod 5, but propodus with four short simple setae distally.

Uropod (Fig. 3H) rudimentary; uniramous, basal article wider than long, embracing base of ramus article 1; article 2 rudimentary with one short and four long rod setae distally.

Distribution. The species was recorded from reefs around Lizard Island (north-eastern Australia) and Ningaloo Reef, (north-western Australia) in coral rubble and on dead heads of coral at depths down to 15 m.

Discussion

Metatanais bipunctatus sp. n., is the second species to be placed in this genus. The setation and ornamentation of the particular appendages is so similar that in the first glance both species could be easily classified as one species. Close examination of the morphology indicates they are separate species and their disjunctive distribution and different habitats support this observation. The characters pinpointed in the diagnosis are stable through the specimens and distinguish the new species from the *M. cylindricus*.

In general appearance the new species is more slender than *M. cylindricus*, which is three times as long as wide. This is explained by the carapace being longer than wide (as widerg than long in *M. cylindricus*) and the relatively long first pereonite that is subequal to the sixth pereonite; Shino (1952) stated that the sixth pereonite in his species is shorter than the first. A size of an article (or segment) is often difficult to substantiate as a quantitative character. There is always a risk that the size can be distorted during ontogeny, by environmental conditions or is the effect of relaxation

of the individual that may either elongate or constrain its body. The last is less possible when an animal is more calcified, as in this case, but even so the flexible segment joints allow overlap of their edges, blurring their actual size; unfortunately the size often remains the only (or one of few) character between sister species (Błażewicz-Paszkowycz 2007).

The new species has a whitish, slightly transparent, glossy cuticle. The pigmentation only involves the eyes and the posterior edge of the carapace and the sixth pereonite where each bears an orange spot. The dark-pigmented eye has less pigment than is found in leptognathids, paratanaids or nototanaids, giving the impression that an eye is minute. This pigment however lasts reasonably long after preservation, while the orange pigment on the pereonites vanishes almost immediately after preservation in ethanol. Shiino (1952) stated that the specimens studied by him were whitish 'without developing any pigment except that of the eye'. It is unknown if he dealt with fresh material and how far we can rely on pigmentation as the character distinguishing both species.

Metatanais bipunctatus has been found in coral rubble and on dead coral heads on opposite sides of tropical Australia: Lizard Island, on the Great Barrier Reef (north-east) and Ningaloo Reef (north-west). This distribution is unusual, owing to the low mobility and lack of free-living larvae in tanaids, particularly in a genus such as *Metatanais*, which is without pleopods. A similar disjunctive distribution has been found in the unrelated paratanaid *Bathytanais culterformis* (Larsen and Heard 2001), originally recorded from north-western Australia while Bamber (2008) later recorded the same species in Moreton Bay, southern Queensland. The tanaidacean fauna of the northern coasts of Australia, between these two regions, is very poorly known. It is possible that the western and eastern populations of *M. bipunctatus* represent two cryptic species, which can only be distinguished by molecular markers.

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